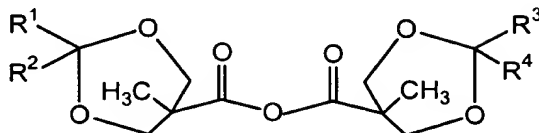


WHAT IS CLAIMED IS:

1. An anhydride having the structure:



wherein,

R¹, R², R³, and R⁴ are members independently selected from substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl and substituted or unsubstituted aryl.

2. The anhydride according to claim 1, wherein each of R¹, R², R³, and R⁴ is an independently selected C₁-C₆ unsubstituted alkyl group.

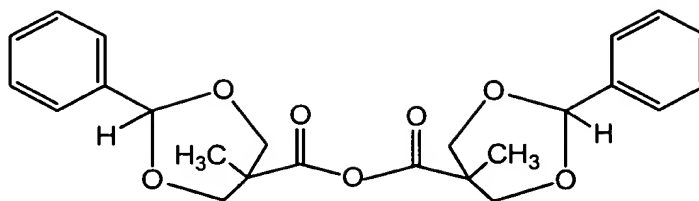
3. The anhydride according to claim 2, wherein said unsubstituted alkyl group is a member selected from the group methyl, ethyl and propyl.

4. The anhydride according to claim 1, wherein said anhydride is a solid, which is substantially free of coupling reagent derived side products.

5. The compound according to claim 1, prepared by a method consisting essentially of:

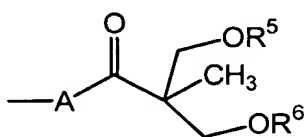
- (a) combining benzylidene-2,2-bis(methoxy)propanoic acid, N,N'-dicyclohexylcarbodiimide and an organic solvent, thereby forming a reaction mixture in which said anhydride is formed;
- (b) filtering said reaction mixture, thereby removing precipitated dicyclohexylurea from said reaction mixture;
- (c) precipitating said anhydride from said reaction mixture by contacting said reaction mixture with a hydrocarbon solvent, thereby producing said anhydride.

6. An anhydride having the structure:



7. The anhydride according to claim 6, wherein said anhydride is a solid and is substantially free of coupling reagent derived side products.

8. A dendrimer which is substantially free of urea side products, said dendrimer comprising a subunit having the structure:

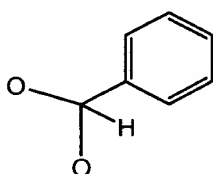


wherein,

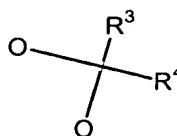
A is an active group, which is a member selected from NH, S and O;

R⁵ and R⁶ are members independently selected from the group consisting of H,

diagnostic agents, therapeutic agents, analytical agents, moieties comprising a reactive group or, alternatively R⁵ and R⁶ together with the oxygen atoms to which they are attached form a structure which is a member selected from the group consisting of:



; and



9. The dendrimer according to claim 8, wherein A is a component of a polymer.

10. The dendrimer according to claim 9, wherein said polymer is a member selected from the group consisting of nucleic acids, linear poly(alkylene oxides), star poly(alkylene oxides), polysaccharides, poly(amino acids) and poly(hydroxystyrene).

11. The dendrimer according to claim 8, wherein said polysaccharide is a member selected from cyclodextrin, starch, hydroxyethyl starch and dextran.

12. The dendrimer according to claim 8, wherein said poly(amino acid) comprises lysine, tyrosine, serine, cysteine, arginine, histidine and combinations thereof.

13. The dendrimer according to claim 7, wherein said polymer is a synthetic organic polymer with pendant NH groups, OH groups, SH groups and combinations thereof.

14. The dendrimer according to claim 11, wherein said synthetic organic polymer is a member selected from poly(vinylphenol), poly(hydroxymethacrylate), poly(N-2-hydroxypropylmethacrylamide), poly(diallylamine), poly(lactic acid) and poly(hydroxymethylcaprolactone), poly(4-hydroxyethylcaprolactone).

15. The dendrimer according to claim 6, wherein said therapeutic agent is a member selected from the group consisting of antiproliferative agents, proteins, anti-cancer chemotherapeutic agents, antibiotics, antivirals, and antiparasitics.

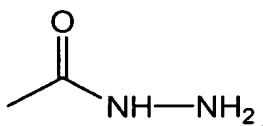
16. The dendrimer according to claim 6, wherein said diagnostic agent is a member selected from MRI contrast agents, X-ray contrast agents, CT contrast agents, PET contrast agents, ultrasonography contrast agents, fluorescent agents, chromophoric agents and radioisotopes.

17. The dendrimer according to claim 8, wherein said subunit repeats from 2 to 100 times.

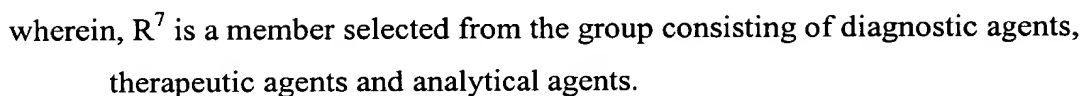
18. The dendrimer according to claim 17, wherein said subunit repeats from 4 to 50 times.

19. The dendrimer according to claim 18, wherein said subunit repeats from 8 to 24 times.

20. A dendrimer according to claim 6, wherein at least one of R⁵ and R⁶ has the structure:



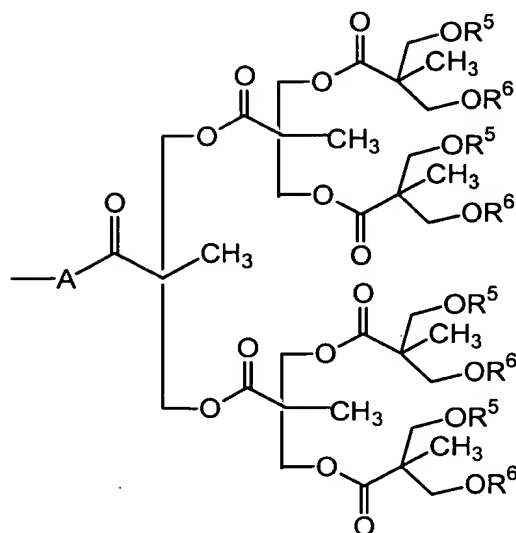
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2
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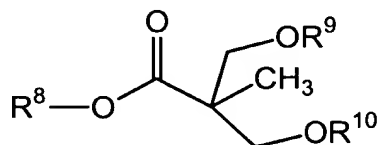
21. 23. A pharmaceutical formulation comprising a dendrimer according to claim 6 and a pharmaceutically acceptable carrier.

*C(=O)C(C)(OC(=O)C(C)(C)OR5)OC(=O)C(C)(C)OR6

79



26. A dendrimer having the structure:



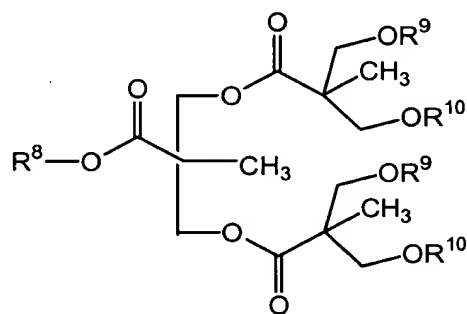
wherein,

R⁸ is a nucleic acid; and

R⁹ and R¹⁰ are members independently selected from H and a poly(ethylene oxide) residue.

27. The dendrimer according to claim 24, said dendrimer being substantially free of urea side products.

28. A dendrimer comprising the structure:



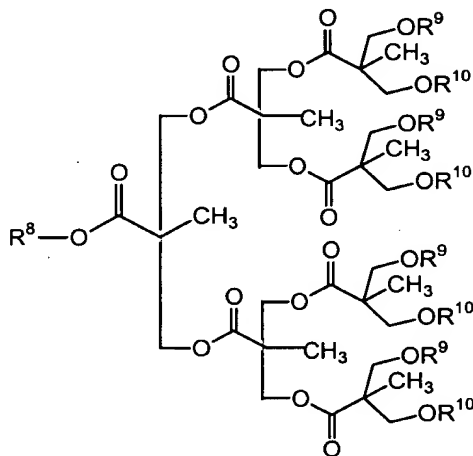
wherein,

R⁸ is a nucleic acid; and

R⁹ and R¹⁰ are members independently selected from H and a poly(ethylene oxide) residue.

1 29. The dendrimer according to claim 26, said dendrimer being
2 substantially free of urea side products.

1 30. A dendrimer comprising the structure:



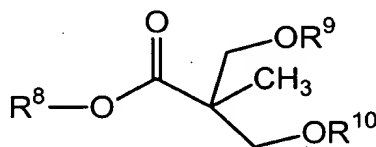
2
3 wherein,

4 R⁸ is a nucleic acid; and

5 R⁹ and R¹⁰ are members independently selected from H and a poly(ethylene
6 oxide) residue.

1 31. The dendrimer according to claim 28, said dendrimer being
2 substantially free of urea side products.

1 32. A biological compartment comprising a membrane defining an interior
2 space, said interior space comprising a dendrimer comprising a subunit having the structure:

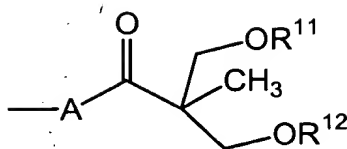


3
4 wherein,

5 R⁸ is a nucleic acid; and

6 R⁹ and R¹⁰ are members independently selected from H and a poly(ethylene
7 oxide) residue.

1 33. A biological compartment comprising a membrane defining an interior
2 space, said interior space comprising a dendrimer comprising a subunit having the structure:



wherein,

A is a residue of an active group; and

R¹¹ and R¹² are members independently selected from the group consisting of H, therapeutic agents and diagnostic agents.

34. The biological compartment according to claim 31, wherein said therapeutic agent is a member selected from the group consisting of antiproliferative agents, proteins, anti-cancer chemotherapeutic agents, antibiotics, antivirals, nucleic acids, and antiparasitics.

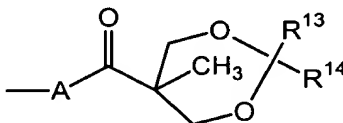
35. The biological compartment according to claim 31, wherein said diagnostic agent is a member selected from MRI contrast agents, X-ray contrast agents, CT contrast agents, PET contrast agents, ultrasonography contrast agents, nucleic acids, fluorescent probes, chromophoric probes and radioisotopes.

36. The biological according to claim 31, wherein A is a residue of a core moiety, and said core moiety is a poly(alkylene oxide) residue.

37. The biological compartment according to claim 36, wherein said core moiety is a poly(ethylene oxide) residue.

38. The biological compartment according to claim 31, wherein said biological compartment is a member selected from cells and organelles.

39. A method of producing a protected first generation dendrimer substantially free of urea side products, said dendrimer comprising a subunit having the structure:



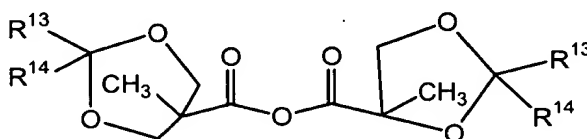
wherein,

A is an active group residue selected from NH, O and S on a core moiety; and

R¹³ and R¹⁴ are components of a diol protecting group and are members independently selected from H, substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl and substituted or unsubstituted aryl, with the proviso that when R¹³ is H, R¹⁴ is other than H;

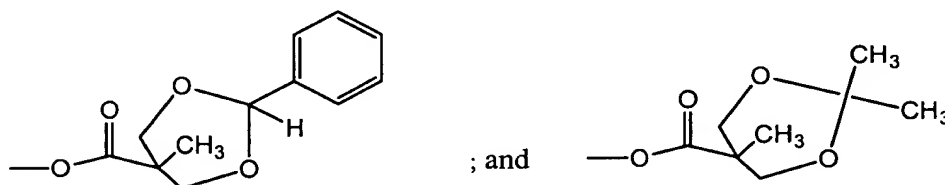
said method comprising:

- (a) forming a reaction mixture by contacting a core moiety comprising A with an acylating group in an organic solvent, said acylating group having the structure:

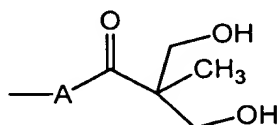


- thereby acylating A, forming said dendrimer; and
(b) extracting said reaction mixture with an aqueous solution, thereby removing impurities.

40. The method according to claim 37, wherein said subunit is a member selected from the group consisting of:



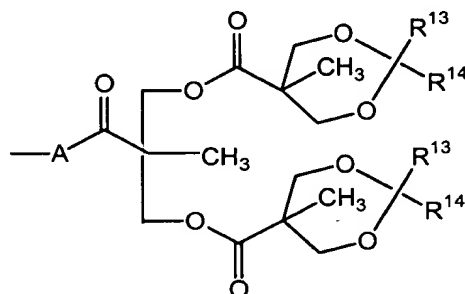
41. The method according to claim 39, further comprising:
(c) removing said diol protecting group, thereby forming a first generation dendrimer comprising a subunit having the structure:



42. A dendrimer prepared by the method according to claim 39.

43. The dendrimer according to claim 40, wherein said dendrimer is a solid.

1 44. A method of producing a protected second generation dendrimer
2 substantially free of urea side products, said dendrimer comprising a subunit having the
3 structure:

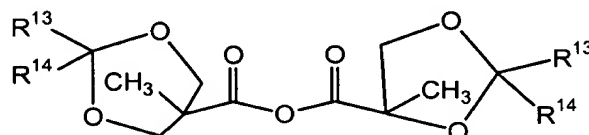


4
5 wherein,

6 A is an active group selected from NH, O and S on a core moiety; and
7 R¹³ and R¹⁴ are components of a diol protecting group and are members
8 independently selected from H, substituted or unsubstituted alkyl, substituted
9 or unsubstituted heteroalkyl and substituted or unsubstituted aryl, with the
10 proviso that when R¹³ is H, R¹⁴ is other than H;

11 said method comprising:

12 (a) contacting said first generation dendrimer according to claim 39 with an
13 acylating group having the structure:

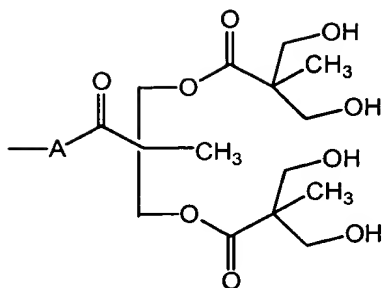


14 thereby acylating A, forming said dendrimer; and

15 (b) extracting said reaction mixture with an aqueous solution, thereby
16 removing impurities.
17

1 45. The method according to claim 44, further comprising:

2 (c) removing said diol protecting group, thereby forming a second generation
3 dendrimer comprising a subunit having the structure:



46. A dendrimer prepared by the method according to claim 44.

47. A dendrimer prepared by the method according to claim 44, wherein said dendrimer is a solid.

48. A method of enhancing water solubility of an agent, said method comprising forming a conjugate between said agent and a dendrimer comprising a subunit having the structure:

